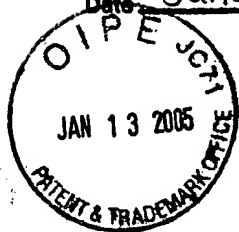


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13 DV 13683

Date January 10, 2005



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicants: Douglas M. Carper)
Serial No.: 09/626,981) Examiner: L. D. Ferguson
Filed: 07/27/2000) Art Unit: 1774
For: Pin Reinforced Composite Article, Fiber Member and Method for Making

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

APPEAL BRIEF

In accordance with 37 C.F.R. 1.192, and in furtherance of the Notice of Appeal filed in this application on 16 November 2004, applicants hereby submit this Appeal Brief in triplicate and request that the decision of the Examiner dated 08/20/2004 finally rejecting claims 1-18 and 35-38 be reversed and that these claims be allowed. A Deposit Account Form is submitted with this brief authorizing the Appeal Fee and any other charges necessary for consideration of this appeal to be charged to General Electric Deposit Account No. 07-0865.

01/18/2005 AWONDAF1 00000046 070865 09626981

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REAL PARTY IN INTEREST

The real party in interest in this Appeal is the assignee of record in the present application, General Electric Company, a corporation of the State of New York.

RELATED APPEALS AND INTERFERENCES

There is no other appeal or interference which is related to or which will directly affect or be directly affected by or have a bearing on the Board's decision in this Appeal.

STATUS OF CLAIMS

Claims cancelled: 19-34.

Claims withdrawn but not cancelled: none.

Claims pending: 1-18 and 35-38.

Claims allowed: none.

Claims rejected: 1-18 and 35-38.

Claim rejections appealed: 1-18 and 35-38.

STATUS OF AMENDMENTS

An amendment after final rejection under 37 C.F.R. 1.116 was filed on 23 September 2004. An advisory action dated 15 October 2004 stated that such amendment failed to place the application in condition for allowance but, for purposes of Appeal, the proposed amendment will be entered.

SUMMARY OF THE INVENTION

The present invention relates to a fiber reinforced composite article or member, for example a turbine engine exhaust flap, engine panel, strut, or fabric sheet for making such an article. The article or member comprises first and second spaced apart and opposed surfaces with a matrix and reinforcing fibers therebetween.

During operation use, a first surface of the article is subjected to a plurality of temperatures and associated stresses differing from one to another in a plurality of discrete areas of the surface. Therefore, at least one area of a first surface is at a temperature different from at least one other area of such first surface. One example is one or more “hot spots” on the article surface as shown in appellant’s Figure 1. Another example is shown in appellant’s Figure 4 that includes a larger plurality of such discrete areas of a surface. Therefore during operation use, the first surface comprises a plurality of distinct surface areas at different temperatures and related stress conditions, extending across the surface. A significant characteristic of such structure is that each of such plurality of temperature and stress conditions in each discrete surface area extends completely through the first surface and through the opposed, spaced apart second surface and the matrix between such surfaces, generally in a columnar type manner.

Appellant has defined and claimed each such distinct surface and matrix structure condition as a region. Accordingly based on such definition, appellant claims an article and member comprising a plurality of discrete regions each extending completely through the first and second surfaces and the matrix of the article therebetween.

A first region of such regions, subjected to a relatively higher temperature and associated first stress, includes first reinforcing fibers having a first strength greater than such first stress. A second of such regions, subjected to a relatively lower temperature and a stress greater than the first stress, includes second reinforcing fibers having a second strength greater than the second stress developed in that region.

Relative surface areas of regions across each first and second surface can be significant to the article of the present invention. Therefore, one form of the claimed invention includes a mathematical “relationship” in which appropriate fiber strengths are defined and based in part on the surface area of a region to the total surface area of all regions on such surface, along with properties of the reinforcing fibers and the operating temperatures.

ISSUES

Issue 1 - Whether claims 1, 2, 4, 6, 8-10, 13-14, 16, 18 and 35-38 are anticipated under 35 U.S.C. 102(b) by Parthasarathy et al. (U.S. 6,251,815).

Issue 2 - Whether claims 3, 5, 7, 11-12, 15 and 17 are unpatentable under 35 U.S.C. 103(a) over Parthasarathy et al. (U.S. 6,251,815).

GROUPING OF CLAIMS

The rejected claims do not stand or fall together in each of the separate issues. Claims 1, 3, 13, and 15, distributed between the issues, are separately argued in their respective issue. The rejected dependent claims based on claims 1 and 3, and on 13 and 15 stand or fall with their respective parent claim.

REFERENCE APPLIED

U.S. Patent 6,251,815 - Parthasarathy et al.

ARGUMENTS**ISSUE 1**

Whether claims 1, 2, 4, 6, 8-10, 13-14, 16, 18 and 35-38 are anticipated under 35 U.S.C. 102(b) by Parthasarathy et al.

The fiber reinforced composite article defined by Parthasarathy et al. is based on their definition of sides or surfaces of their article. The article of the reference is defined as having a hot operating side (a first surface) and an opposite cool operating side (a second surface) with a total article thickness (matrix) therebetween. As a result of the thermal gradient existing between such sides at different temperatures and associated stresses, failure of the article had been observed. Such problem is described in their column 1, lines 24-36.

The article proposed by Parthasarathy et al. to solve such problem first is described in their column 2, lines 6-39. Structurally, it is completely different from the article and member of the appealed claims. To avoid such failure by interrupting and diffusing a direct thermal gradient path between such sides, and transitioning the thermal operating stresses, the reference teaches providing a plurality of different and distinct layers of matrix and fibers, as a stack of layers, between the hot side and the cool side. Each layer includes a different selection of reinforcing fibers to provide a transition of the stresses between the sides. The reference calls each such layer a region.

The description of Parthasarathy et al. clearly teaches throughout, in all examples and according to their own definition of regions and sides, that no such region or layer extends completely through the hot side, the cool side and the thickness therebetween: to do so would defeat the object of their defined article. A boundary or interface between their adjacent layers is not a side or surface of the article as defined by the reference. In one embodiment, their article has two stacked layers or regions (col. 2, lines 10-19; col. 3, lines 46-56), and in another embodiment, their article has three stacked layers or regions (col. 2, lines 23-35; col. 3, line 62 through col. 4, line 15). In no embodiment of the reference does it teach or suggest that a region extend completely through the hot side, the cool side and the thickness or matrix therebetween, as in the article and member of the appealed claims. Thus there is no basis for the Examiner to propose that Parthasarathy et al. can anticipate the article of the appealed claims.

The article of the reference and the article and member of the appealed claims both relate generally to fiber reinforced composite articles, both refer to the same type of commercially available reinforcing fibers, and both use a term "region" to define an internal structure. However, such similarities do not change the basic fact that the article structure described by Parthasarathy et al. and discussed above is of a completely different kind from, structurally the opposite of, and cannot anticipate the article and member claimed by appellant according to well-established anticipation requirements. For example, the basis for anticipation of an invention under 35 U.S.C. 102 has been established in a variety of reviews, typical of which is *Lindemann Maschinenfabrik*

Gmbh v. American Hoist and Derrick Co., 730 F.2d, 221 USPQ 481 (Fed. Cir. 1984) which stated:

Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim. In deciding the issue of anticipation, the trier of fact must identify the elements of the claims, determine their meaning in light of the specification and prosecution history, and identify corresponding elements disclosed in the allegedly anticipating reference. (citations omitted).

The Board of Patent Appeals and Interferences in *Ex parte Levy*, 17 USPQ2d 1461, 1462 (B.P.A.I. 1990) cites *Lindemann* to place the burden of proof upon the Examiner as follows:

Moreover, it is incumbent upon the examiner to identify wherein each and every facet of the claimed invention is disclosed in the applied reference.

Therefore, Parthasarathy et al. cannot anticipate the invention of the appealed claims because the article of the reference cannot include the presence of the kind of structure discussed above and claimed by appellant.

Claims 2 and 35-38 stand or fall with and as forms of the invention of claim 1. Claims 4, 6 and 8-10 stand or fall with and as forms of the invention of claim 1 in combination with claim 3 from which they depend, claim 3 being included only in the rejection of Issue 2. Claim 14 stands or falls with and as a form of the invention of claim 13. Claims 16 and 18 stand or fall with and as forms of the invention of claim 13 in combination with claim 15 from which they depend, claim 15 being included only in the rejection of Issue 2.

From the arguments presented above, it is clear that Parthasarathy et al. does not describe, or remotely suggest or imply an article that can anticipate the article or member of the appealed claims. Accordingly, reversal of the rejection of claims 1, 2, 4, 6, 8-10, 13-14, 16, 18 and 35-38 under 35 U.S.C. 102(b) based on Parthasarathy et al. is warranted and respectfully is requested.

ISSUE 2

Whether claims 3, 5, 7, 11-12, 15 and 17 are unpatentable under 35 U.S.C. 103(a) over Parthasarathy et al. (U.S. 6,251,815).

A detailed description and discussion of Parthasarathy et al. has been presented above, all of which is repeated here in connection with the rejection of Issue 2 based on that same reference. As was shown and argued in detail above, the article defined by the reference cannot include or remotely suggest the structure of the article or member of the appealed claims. Because the reference and the invention of the appealed claims both relate to fiber reinforced composite structures, use as examples commercially available materials, and use similar terms such as “region”, does not change the basic structural differences as argued above. Therefore, the subject matter of the rejected claims could not have been obvious at the time the present invention was made to a person having ordinary skill in the art to which the invention of the appealed claims pertain.

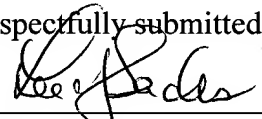
According to embodiments of the present invention, the relative size of a surface area of a region, for example in a first surface, to the total area of all regions in such surface can be used with properties of reinforcing fibers and operating temperatures to determine the strength required in a cooler region compared with another region on such surface. Such embodiments are represented by claims 3 and 15. Appellant’s description (for example on page 3, lines 2-9; and page 5, line 21 through page 6, line 27) includes the basis for such claims. That form of the invention represents a definition and description of the strength level required in a surface area, and hence the respective region, based on relative sizes of surface areas of regions in a surface, on observed conditions and on material properties. Such invention cannot be suggested or made obvious to one of ordinary skill in the art by Parthasarathy et al. because each of their individual sides or surfaces of an article is at a given temperature, hot or cool, and include no discrete surface areas at different temperatures. There is no basis in the reference to suggest to anyone that an article surface (hot or cool) be considered to include a plurality of discrete surface areas or variation in surface temperatures as in the structure of the appealed claims.

The Federal Circuit in *In re Gordon et al.*, 221 USPQ 1125, 1127 (Fed. Cir. 1984) held that:

“ The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification.”

From all of these arguments, it is clear that Parthasarathy et al. does not describe, or remotely suggest an article from which it would be obvious to anyone at any time to make the article or member of the appealed claims. Accordingly, reversal of the rejection of claims 3, 5, 7, 11-12, 15, and 17 under 35 U.S.C. 103(a) as being unpatentable over Parthasarathy et al. is warranted and respectfully is requested.

Respectfully submitted,



Lee H. Sachs
Reg. No. 18898

General Electric Co.
P.O. Box 156301 – M/D H-17
Cincinnati, Ohio 45215 – 6301
(513) 243 - 8925
07 January 2005

Attachment: Appendix of Claims

APPENDIX OF CLAIMS

The claims involved in the appeal are:

1. A fiber reinforced composite article comprising a first surface, a second surface opposed to and spaced apart from the first surface, and a matrix and reinforcing fibers therebetween wherein:

the article comprises a plurality of discrete regions each extending completely through the first and second surfaces and the matrix of the article therebetween;

a first region of the plurality of regions of the article during operation use subjected to a first temperature and a first stress, and including first fibers having a first strength greater than the first stress; and,

a second region of the plurality of regions of the article during operation use subjected to a second temperature less than the first temperature and a second stress greater than the first stress, and including second fibers having a second strength greater than the second stress.

2. The article of claim 1 in which:

the first fibers have a first coefficient of thermal expansion (CTE) at the first temperature; and,

the second fibers have a second CTE at the second temperature greater than the first CTE at the first temperature.

3. The article of claim 2 in which the second strength of the second region is greater than the difference between the first stress and the second stress as determined by the relationship:

$A_1 E_1 \alpha_1 T_1 - A_2 E_2 \alpha_2 T_2 < S_2$, in which, respectively for the first region (1) and the second region (2):

A is the area ratio of a region area to a total area of the regions,

E is the elastic modulus of the fiber reinforced matrix,

α is the CTE of the fiber reinforced matrix at the operating temperature in °F,

T is the operating temperature in °F, and

S is the strength of the second region.

4. The article of claim 3 in which the first and second fibers are in at least one form selected from the group consisting of fabric, weave, braid, and lay-up.

5. The article of claim 3 in which:

the first temperature is in the range of about 1600 - 2000° F; and,

the second temperature is in the range of about 900 - 1300° F.

6. The article of claim 5 in which the matrix is ceramic based on alumina.

7. The article of claim 5 in which the fibers are included in the range of about 20 – 70 volume %.

8. The article of claim 6 in which the first and second fibers are based on alumina.

9. The article of claim 6 in which the matrix includes silica.

10. The article of claim 5 in the form of a turbine engine article in which:

the matrix is a ceramic; and,

the first fibers and the second fibers are high temperature fibers made from at least one material selected from the group consisting of alumina, silica, glass, graphite, carbon, carbides, tungsten, boron, and their mixtures.

11. The article of claim 9 in the form of a gas turbine engine exhaust flap in which the fibers are included in each region in the range of about 20 – 70 volume %.

12. The article of claim 4 in the form of a gas turbine engine blading component in which the fibers are included in each region in the range of about 20 – 70 volume %.

13. A member comprising reinforcing fibers for reinforcement of a fiber reinforced composite article, the member comprising a first surface, a second surface opposed to and spaced apart from the first surface, and a matrix and the reinforcing fibers therebetween wherein:

the member comprises a plurality of discrete regions each extending completely through the first and second surfaces and the matrix of the member therebetween;

a first region of the plurality of the member during operation use subjected to a first temperature and a first stress, and including first fibers having a first strength greater than the first stress; and,

a second region of the plurality of the member during operation use subjected to a second temperature less than the first temperature and a second stress greater than the first stress, and including second fibers having a second strength greater than the second stress.

14. The member of claim 13 in which:

the first fibers have a first coefficient of thermal expansion (CTE) at the first temperature; and,

the second fibers have a second CTE at the second temperature greater than the first CTE at the first temperature.

15. The member of claim 14 in which the second strength of the second region of the article is greater than the difference between the first stress and the second stress as determined by the relationship:

$A_1 E_1 \alpha_1 T_1 - A_2 E_2 \alpha_2 T_2 < S_2$, in which, respectively for the first region (1) and the second region (2):

A is the area ratio of a region area to a total area of the regions,

E is the elastic modulus of the fiber reinforced matrix,

α is the CTE of the fiber reinforced matrix at the operating temperature in °F,

T is the operating temperature in °F, and

S is the strength of the second region.

16. The member of claim 14 in at least one form selected from the group consisting of fabric, weave, braid, and lay-up.

17. The member of claim 15 in which:

the first temperature is in the range of about 1600 - 2000° F; and,

the second temperature is in the range of about 900 - 1300° F.

18. The member of claim 17 in which the first and second fibers are based on alumina.

35. The article of claim 1 in which:

the first region comprises a first stack of first fiber woven fabric shapes, the first stack extending completely through the first region, the first woven fabric shapes comprising a first combination of reinforcing fibers; and,

the second region comprises a second stack of second fiber woven fabric shapes, the second stack extending completely through the second region, the second woven fabric shapes comprising a second combination of reinforcing fibers having a coefficient of thermal expansion (CTE) during operation of the article different from the first combination.

36. The article of claim 35 in which the first combination of reinforcing fibers of the first woven fabric shape for the first stack and the second combination of reinforcing fibers of the second woven fabric shape for the second stack each are included in a pattern repeated in a fabric member, a plurality of the fabric members disposed in a composite article stack that maintains the same relative position of the pattern completely through the composite article stack to provide the first and second regions.

37. The member of claim 13 in which:

the first region comprises a first stack of first fiber woven fabric shapes, the first stack extending completely through the first region, the first woven fabric shapes comprising a first combination of reinforcing fibers; and,

the second region comprises a second stack of second fiber woven fabric shapes, the second stack extending completely through the second region, the second woven fabric shapes comprising a second combination of reinforcing fibers having a coefficient of thermal expansion (CTE) during operation of the article different from the first combination.

38. The member of claim 37 in which the first combination of reinforcing fibers of the first woven fabric shape for the first stack and the second combination of reinforcing fibers of the second woven fabric shape for the second stack each are included in a pattern in a fabric member, a plurality of the fabric members disposed in a composite article stack that maintains the same relative position of the pattern completely through the composite article stack to provide the first and second regions.



PTO/SB/17 (10-04)

Approved for use through 07/31/2006. OMB 0651-0032
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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

FEE TRANSMITTAL for FY 2005

Effective 10/01/2004. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT

(\$ 340.00)

Complete if Known

| | |
|----------------------|-------------------|
| Application Number | 09/626,981 |
| Filing Date | July 27, 2000 |
| First Named Inventor | Douglas M. Carper |
| Examiner Name | L.D. Ferguson |
| Art Unit | 1774 |
| Attorney Docket No. | 13DV13683 |

METHOD OF PAYMENT (check all that apply)☐ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None☒ Deposit Account:Deposit
Account
Number
Deposit
Account
Name

07-0865

General Electric Company

The Director is authorized to: (check all that apply)

☒ Charge fee(s) indicated below ☒ Credit any overpayments☒ Charge any additional fee(s) or any underpayment of fee(s)☐ Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.**FEE CALCULATION****1. BASIC FILING FEE**

| Large Entity | | Small Entity | | Fee Description | Fee Paid |
|--------------|----------|--------------|----------|------------------------|----------|
| Fee Code | Fee (\$) | Fee Code | Fee (\$) | | |
| 1001 | 790 | 2001 | 395 | Utility filing fee | |
| 1002 | 350 | 2002 | 175 | Design filing fee | |
| 1003 | 550 | 2003 | 275 | Plant filing fee | |
| 1004 | 790 | 2004 | 395 | Reissue filing fee | |
| 1005 | 160 | 2005 | 80 | Provisional filing fee | |
| SUBTOTAL (1) | | | | | (\$) |

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

| Total Claims | | Extra Claims | | Fee from below | Fee Paid |
|--------------------|--------------------|--------------|--------|----------------|----------|
| Independent Claims | Multiple Dependent | -20** = | -3** = | | |
| | | | | | |

| Large Entity | | Small Entity | | Fee Description |
|--------------|----------|--------------|----------|--|
| Fee Code | Fee (\$) | Fee Code | Fee (\$) | |
| 1202 | 18 | 2202 | 9 | Claims in excess of 20 |
| 1201 | 88 | 2201 | 44 | Independent claims in excess of 3 |
| 1203 | 300 | 2203 | 150 | Multiple dependent claim, if not paid |
| 1204 | 88 | 2204 | 44 | ** Reissue independent claims over original patent |
| 1205 | 18 | 2205 | 9 | ** Reissue claims in excess of 20 and over original patent |

SUBTOTAL (2)

(\$)

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)**3. ADDITIONAL FEES**

Large Entity Small Entity

| Fee Code | Fee (\$) | Fee Code | Fee (\$) | Fee Description | Fee Paid |
|----------|----------|----------|----------|--|----------|
| 1051 | 130 | 2051 | 65 | Surcharge - late filing fee or oath | |
| 1052 | 50 | 2052 | 25 | Surcharge - late provisional filing fee or cover sheet | |
| 1053 | 130 | 1053 | 130 | Non-English specification | |
| 1812 | 2,520 | 1812 | 2,520 | For filing a request for ex parte reexamination | |
| 1804 | 920* | 1804 | 920* | Requesting publication of SIR prior to Examiner action | |
| 1805 | 1,840* | 1805 | 1,840* | Requesting publication of SIR after Examiner action | |
| 1251 | 110 | 2251 | 55 | Extension for reply within first month | |
| 1252 | 430 | 2252 | 215 | Extension for reply within second month | |
| 1253 | 980 | 2253 | 490 | Extension for reply within third month | |
| 1254 | 1,530 | 2254 | 765 | Extension for reply within fourth month | |
| 1255 | 2,080 | 2255 | 1,040 | Extension for reply within fifth month | |
| 1401 | 340 | 2401 | 170 | Notice of Appeal | |
| 1402 | 340 | 2402 | 170 | Filing a brief in support of an appeal | 340.00 |
| 1403 | 300 | 2403 | 150 | Request for oral hearing | |
| 1451 | 1,510 | 1451 | 1,510 | Petition to institute a public use proceeding | |
| 1452 | 110 | 2452 | 55 | Petition to revive - unavoidable | |
| 1453 | 1,330 | 2453 | 665 | Petition to revive - unintentional | |
| 1501 | 1,370 | 2501 | 685 | Utility issue fee (or reissue) | |
| 1502 | 490 | 2502 | 245 | Design issue fee | |
| 1503 | 660 | 2503 | 330 | Plant issue fee | |
| 1460 | 130 | 1460 | 130 | Petitions to the Commissioner | |
| 1807 | 50 | 1807 | 50 | Processing fee under 37 CFR 1.17(q) | |
| 1806 | 180 | 1806 | 180 | Submission of Information Disclosure Stmt | |
| 8021 | 40 | 8021 | 40 | Recording each patent assignment per property (times number of properties) | |
| 1809 | 790 | 2809 | 395 | Filing a submission after final rejection (37 CFR 1.129(a)) | |
| 1810 | 790 | 2810 | 395 | For each additional invention to be examined (37 CFR 1.129(b)) | |
| 1801 | 790 | 2801 | 395 | Request for Continued Examination (RCE) | |
| 1802 | 900 | 1802 | 900 | Request for expedited examination of a design application | |

Other fee (specify)

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$ 340.00)

SUBMITTED BY

(Complete if applicable)

| | | | | | |
|-------------------|-------------------|-----------------------------------|---------------|-----------|----------------|
| Name (Print/Type) | David Lee Narciso | Registration No. (Attorney/Agent) | 35,624 | Telephone | (513) 243-8925 |
| Signature | | Date | Jan. 10, 2005 | | |

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SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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